

13-1

Standardized Test Prep

Experimental and Theoretical Probability

Multiple Choice

For Exercises 1–4, choose the correct letter.

1. What is the probability of rolling a number greater than 2 on a number cube? **D**

☐ A $\frac{1}{6}$

☐ B $\frac{1}{3}$

☐ C $\frac{1}{2}$

☐ D $\frac{2}{3}$

2. A coin is tossed 30 times and lands on heads 17 times. What is the experimental probability of the coin landing on *tails*? **H**

☐ F $\frac{17}{30}$

☐ G $\frac{1}{2}$

☐ H $\frac{13}{30}$

☐ I $\frac{8}{15}$

3. What is the theoretical probability of randomly choosing a science book from a shelf that holds 3 mystery books, 5 science books, and 4 nature books? **C**

☐ A $\frac{1}{4}$

☐ B $\frac{1}{3}$

☐ C $\frac{5}{12}$

☐ D $\frac{7}{12}$

4. What is the complement of rolling a 2 or 5 on a number cube? **G**

☐ F $\{5, 2\}$

☐ G $\{1, 3, 4, 6\}$

☐ H $\{1, 3, 4, 5\}$

☐ I $\{7\}$

Short Response

5. A spinner has four equal sections labeled 2, 4, 6 and 8. Suppose you spin the spinner twice. What is the theoretical probability that the sum of the outcomes is 10? Show the favorable outcomes.

[2] $\frac{1}{4}$ (OR equivalent fraction); (2, 8), (4, 6), (6, 4), (8, 2)

[1] Student provides a correct probability based on a partial list of favorable outcomes.

[0] Student's response shows no effort OR does not correctly use sample space to determine probability.

13-2

Standardized Test Prep

Probability Distributions and Frequency Tables

Multiple Choice

Use the table below for Exercises 1–4. Choose the correct letter.

The table below shows the results of a soccer team's scores for games played this season.

Goals	0	1	2	3
Frequency	4	7	5	3

1. How many games did the team play? **C**

(A) 3

(B) 6

(C) 19

(D) 25

2. What is the relative frequency of games with 1 goal scored? **H**

(F) $\frac{3}{19}$

(G) $\frac{7}{25}$

(H) $\frac{7}{19}$

(I) $\frac{8}{15}$

3. What is the probability that the team scored 2 or more goals? **B**

(A) $\frac{5}{19}$

(B) $\frac{8}{19}$

(C) $\frac{5}{8}$

(D) $\frac{8}{11}$

4. Which expression can be used to determine the probability of scoring fewer than 3 goals? **F**

(F) $1 - \frac{3}{19}$

(G) $\frac{3}{19} - 1$

(H) $1 - \frac{16}{19}$

(I) $1 + \frac{3}{19}$

Short Response

5. The relative frequencies of two of three possible outcomes are $\frac{1}{2}$ and $\frac{1}{3}$. What is the relative frequency of the third outcome?

[2] $\frac{1}{6}$ (or equivalent fraction)

[1] Student provides evidence showing an understanding that the sum of the frequencies is 1.

[0] Student's response shows no effort OR does not attempt to make the frequencies add to 1.

13-3 Standardized Test Prep

Permutations and Combinations

Gridded response

Solve each exercise and enter your answer on the grid provided.

- In how many different ways can 6 books be arranged on a bookshelf?
- The options for a college's science classes are shown in the table.

Title	Grade Types	Times
Science 101	Pass/Fail	9:00 am
Science 105	Letter Grade	10:30 am

How many combinations of class, type, and times are available?

- How many combinations of 4 fish can you choose from a tank containing 8 fish?
- A bag contains 7 marbles: one each of red, orange, yellow, green, blue, violet, and white. A child randomly pulls 4 marbles from the bag. What is the probability that the marbles chosen are green, blue, red, and yellow? Round your answer to the nearest hundredth.
- A teacher wants to choose one student to take attendance, one student to hand out papers, and one student to collect homework. If there are 16 students in the class, in how many different ways can the students be chosen?

Answers

1.	7 2 0	2.	8	3.	7 0	4.	0 . 6 9	5.	3 3 6 0

13-4

Standardized Test Prep

Compound Probability

Multiple Choice

For Exercises 1–4, choose the correct letter.

1. What is the probability of rolling a 5 on a number cube and randomly drawing the 2 of Clubs from a deck of cards? **A**

☐ A $\frac{1}{312}$

☐ B $\frac{1}{260}$

☐ C $\frac{1}{24}$

☐ D $\frac{1}{2}$

2. In one class, 19% of the students received an A on the last test and 13% of the students received a C. What is the probability that a randomly chosen student received an A or a C? **I**

☐ F 0.06

☐ G 0.13

☐ H 0.16

☐ I 0.32

3. What is the probability of rolling a 3 or a number less than 4 on a number cube? **B**

☐ A $\frac{5}{19}$

☐ B $\frac{1}{2}$

☐ C $\frac{2}{3}$

☐ D $\frac{3}{4}$

4. You win 6 out of every 10 races you run. Your friend wins 7 out of every 9 dancing competitions she enters. What is the probability of you both winning your next events? **G**

☐ F $\frac{7}{16}$

☐ G $\frac{7}{15}$

☐ H $\frac{21}{40}$

☐ I $\frac{13}{19}$

Short Response

5. The results of a survey revealed that 26% of the students read fiction in their spare time, 21% of the students read non-fiction, and 7% don't read in their spare time. What is the probability that a randomly chosen student reads fiction or doesn't read in her spare time?

[2] 0.33 or 33%

[1] Student provides evidence of combining 2 of the percentages.

[0] Student's response shows no effort OR does not attempt to add 2 of the percentages.

13-5

Standardized Test Prep

Probability Models

Multiple Choice

For Exercises 1–4, choose the correct letter.

The table below shows the number of participants at a charity event who walked or ran, and who wore a red t-shirt or a blue t-shirt. Use the table for Exercises 1–4.

	Blue t-shirt	Red t-shirt	Totals
Walk	80	30	110
Run	20	30	50
Totals	100	60	160

- What is the probability that a randomly chosen person ran and wore a blue t-shirt? **A**
 (A) 0.125 (B) 0.25 (C) 0.4 (D) 25
- What is the probability that a randomly chosen person walked and wore a red t-shirt? **G**
 (F) 0.18 (G) 0.1875 (H) 0.3525 (I) 0.5
- What is $P(\text{ran} \mid \text{wore a blue t-shirt})$? **A**
 (A) 0.2 (B) 0.25 (C) 0.4 (D) 0.8
- What is the probability that a randomly chosen runner wore a blue t-shirt? **G**
 (F) 0.3 (G) 0.4 (H) 0.5 (I) 0.6

Short Response

- When calculating $P(B \mid A)$, why is $P(A)$ in the denominator?
[2] $P(A)$ is the denominator because it is the event that has already happened, and represents the total population for the probability.
[1] Student provides evidence showing an understanding of conditional probability calculations.
[0] Student's response shows no effort OR does not attempt to explain the probability in terms of a fraction.

13-6

Standardized Test Prep

Conditional Probability Formulas

Multiple Choice

For Exercises 1–4, choose the correct letter.

A physician determined that on average, 40% of his patients get the flu each year. Of this group, 10% received the flu vaccine. Of the patients who do not get the flu, 20% received the flu vaccine. Use this information for Exercises 1 and 2.

1. What is the probability that someone who did not receive the vaccine got the flu? **B**
☐ (A) 0.25 ☐ (B) 0.43 ☐ (C) 0.75 ☐ (D) 0.75
2. What is the probability that someone who received the vaccine got the flu? **F**
☐ (F) 0.25 ☐ (G) 0.33 ☐ (H) 0.5 ☐ (I) 0.66
3. Of the 85% of the students in a class who studied for a test, 75% passed the test. Of the 15% of the students who did not study, 30% passed. What is the combined probability of passing? **C**
☐ (A) 0.3 ☐ (B) 0.6375 ☐ (C) 0.6825 ☐ (D) 0.75
4. In a survey, 60% of the people own a laptop computer, 80% own a desktop computer, and 30% own both. What is the conditional probability that a laptop computer owner also owns a desktop computer? **H**
☐ (F) 0.3 ☐ (G) 0.4 ☐ (H) 0.5 ☐ (I) 0.6

Short Response

5. When calculating $P(B | A)$, what does A represent?
[2] **A represents an event that has already happened, and is the population you are finding the probability within.**
[1] **Student provides evidence showing an understanding of conditional probability calculations.**
[0] **Student's response shows no effort OR does not attempt to explain the probability in terms of an event that has already happened.**

13-7

Standardized Test Prep

Modeling Randomness

Multiple Choice

For Exercises 1–4, choose the correct letter.

For Exercises 1 and 2, use the lines from a random number table to select numbers to use in each problem.

1. Using the table below, which numbers would you use to choose 3 students from a group of 50 students? **B**

36674 86790 98265 42947 20763

- (A) 36, 48, 42 (B) 36, 48, 26 (C) 36, 48, 9 (D) 48, 26, 42

2. There are students from 4 different towns at a conference. Using the random number table below, how many students would be randomly chosen until one from each town is chosen? **H**

13231 23121 42314 13423

- (F) 3 (G) 10 (H) 11 (I) 15

3. In each roll of a game piece, there is a 64% chance of losing 2 points and a 36% chance of winning 7 points. What is the expected value for each roll? **B**

- (A) -1.28 (B) 1.24 (C) 2.52 (D) 3.8

4. In a game at the fair, a player has a 43% chance of making a 3-point shot and a 32% chance of making a 4-point shot. Which shows the greater probability shot and difference between expected values? **H**

- (F) 4-point by 0.01 (G) 4-point by 0.08 (H) 3-point by 0.01 (I) 3-point by 0.08

Extended Response

5. In a game at a fundraiser, Choice A has a 12% of winning 8 prize tickets and Choice B has a 46% chance of winning 2 prize tickets. Describe how you would choose between playing Choice A or Choice B.

[4] I would play choose Choice A because it has an expected value 0.04 greater than Choice B. Choice A: $0.12 \times 8 = 0.96$; Choice B: $0.46 \times 2 = 0.92$; $0.96 - 0.92 = 0.04$

[3] Appropriate methods with one computational error.

[2] Appropriate methods with multiple computational errors.

[1] Correct answers without work shown.

[0] Student's response shows no effort OR does not attempt to explain the probability in terms of an event that has already happened.